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[Reprinted from "The Sociological Review," April, 1909].

Race Progress and Race Degeneracy

BY

G. CHATTERTON HILL

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RACE PROGRESS AND RACE DEGENERACY.*

It is unfortunately a fact that there still exist grave divergencies of opinion between experts on the question of heredity, which is, of course, at the root of the whole problem of race progress and degeneracy; and advantage is taken of these divergencies to neglect entirely even the recognised laws of the breeding of offspring. There exists no more imperative task than that of putting an end to this state of things, and bringing home to the masses the essential importance of a knowledge of the conditions under which healthy offspring are reared.

The celebrated theory of Weismann is too well known, at least in its main outlines, to need any elaborate description here. It will suffice to say that, according to Weismann, in every multi-cellular organism are contained two distinct substances—the germ-plasm, which is affected to the reproduction of the species, and which transmits itself from one generation to another; and the somato-plasm, which is affected to the needs of the individual life, and which is consumed by the ontogeny. The Protozoa (unicellular organisms) do not differentiate their organic substance into two kinds, the cell being capable, not only of maintaining individual life, but of securing the persistence of the species; certain cell-colonies of Algae ("Volvox") show us first a functional differentiation between the cells, some of these being exclusively adapted to the maintenance and repair of individual life, and others having the capacity of reproduction.

The germ-cell or hereditary substance of all multi-cellular organisms is composed of a number of Chromosomes or Idants (*i.e.*, groups of Ids), whose number varies according to the species, but is constant for each species. Each Id contains the sum total of the features, characteristics, and dispositions of the individual in the shape of a number of Determinants, and each group of Determinants stands in precise and well-defined relation to some hereditary variable part of the organism. The Determinants possess a well-defined structure, and are composed of a mass of differentiated Biophors, or elementary living particles, capable of growth and of reproduction by division.

The great central fact in Weismann's doctrine is thus the distinction between Germ-Plasm (affected to the needs of the Species) and Somato-Plasm (affected to the needs of the Individual). The former is potentially immortal, and, while remaining *structurally* unaltered during the life of the individual, can be transmitted from one generation to another.[1]

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* A Paper read before the Sociological Society, March 22, 1909.

Once we come to the problem of the origin of variations, we find widely divergent opinions. On the one hand the prevailing medical view is that the germ-cells are capable of being modified by environmental influences, and that genetic variations (*i.e.*, the variations of species) are the result of such influences. It ensues that the germ-cells are highly susceptible to environmental change, and that they will vary in a favourable or in an unfavourable manner according as the environment is favourable or unfavourable. On the other hand the diametrically opposite view is taken by Dr. Archdall Reid, who is of opinion that the germ-plasm is very highly indifferent to the action of the environment, and " therefore that children are seldom affected by the influences to which their parents are exposed." [2] Dr. Reid even goes so far as to say that "we know that the offspring of diseased and intemperate people are often perfectly normal and robust." Diametrically opposite conclusions must be the result of such diametrically opposite premisses. The partisans of the first theory, who hold fast to the view that the germ-cells are very susceptible to environmental influences, demand the removal of any detrimental element in those influences, owing to the danger presented by the probability of germ infection. Dr. Archdall Reid, from the contrary point of view, believes the germ-cells to run practically no danger of infection as the result of detrimental environmental influences.

But this question as to the origin of variations involves other highly-important questions touching the welfare of the race. Obviously, if we hold the germ-plasm to be extremely susceptible to environmental influences, we must expect a race to grow strong and vigorous if placed amid favourable surroundings, *i.e.*, among surroundings that will benefit the germ-cells of its individuals; and, *vice-versa,* we must expect the race to degenerate if the surroundings are unfavourable. On the other hand, if the reaction of the environment on the germ-cells be slight, the shaping of that environment in a favourable sense ceases to be a matter of great moment. Nevertheless, those who adopt the latter view, and among them Dr. Archdall Reid, do none the less reckon the environment among the chief factors which determine the qualities of a race, although it seems hard to reconcile two such conf theories. But whereas the former view sees in a *favourable* environment the *conditio sine qua non* of race progress, the latter one sees such a condition realised by an *unfavourable* environment. In an environment which is unfavourable to individual development, they say, only those individuals who are stronger than the average can survive; the weaker will be unable to adapt themselves and will be eliminated; and it is incontestable that such a process, as regards the species as a whole, is a distinctly beneficent one. Amid favourable surroundings there is no scope for the action of natural selection, which ensures the survival of the fit and the elimination of the unfit. Under such conditions, all detrimental influences having been removed, the weak and ill-adapted can survive as easily as the strong; and the result will be the progressive degeneration of the whole race, in virtue of the law of panmixia.

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[1] The very interesting theory of heredity propounded by Beard, is, as far as this fundamental point is concerned, in essential agreement with that of Weismann. According to Beard, the germ-cells are absolutely distinct from the organism, and are not derived from the latter but from a parental group of similarly distinct germ cells. (Dr. John Beard, *The Track of Heredity in Plants and Animals*, in *Transactions and Proceedings of the Botanical Society of Edinburgh*, January, 1902; also *The Morphological Continuity of Germ-Cells as the Basis of Heredity and Variation*, in *Review of Neurology and Psychiatry*, January, February, March, 1904; and numerous papers in *Anatomischer Anzeiger*, Bd. viii, 1892; and *Zoologische Jahrbücher*, Bd. xvi, 1902. An account of Beard's researches is withheld for lack of space.)

[2] *The Biological Foundations of Sociology*, p. 10.

This standpoint, which Dr. Archdall Reid especially has adopted, is hardly consistent, since, on the one hand, the germ-cells are declared insusceptible to environmental influences; and, on the other, the action of the latter is still admitted, since those individuals whose germ-cells are ill-adapted will be eliminated, while those whose germ-plasm is adapted will thrive. If, as Dr. Reid declares, the germ-cells are susceptible to environmental change only in the slightest degree, the nature of the environment should be indifferent.

To a certain extent both the views above described are correct. The germ-cells are certainly susceptible to certain environmental influences, but not to all; and we thoroughly agree with Dr. Archdall Reid when he maintains that a universally favourable environment cannot but have detrimental results for the species as a whole, since it checks the action of natural selection and admits of the survival of the unfit on the same terms as the fit.

In order to arrive at a proper understanding of the root-question as to how far the germ-plasm is susceptible to the environmental influences it is necessary for us to classify these. We may distinguish four categories of influences which may be designated as environmental or exogenous, viz.:—

1. The influence of blows, wounds, and mutilations.
2. The influence of use and disuse.
3. The influence of climate and temperature.
4. The influences which react on the germ-plasm through the intermediary of the nutritive fluids of the organism: (*a*) Food, (*b*) Pathogenic infection.

With regard to the first two categories, it is certain that their influence on the germ-plasm is absolutely *nil*. Experiments made by Weismann on no less than 22 successive generations of mice, in which the tail of both parents was in every case cut off, yielded an entirely negative result; not one of the 1,592 mice born in successive generations from mutilated parents bore a trace of this mutilation which had been inflicted on both parents, and the experiment may be considered as decisive as far as the transmission of somatic mutilations is concerned. As regards use and disuse, it is evident that the limbs, muscles, and organs of an individual will be developed and strengthened by constant use, as also the psychical faculties; but the attainments thus acquired are never transmitted by heredity. The effects of use and disuse are confined to the individual, and do not have the least influence on the germ-plasm.

This conclusion may perhaps be challenged by those who are aware of the researches made by Heymans and Wiersma in Holland, supported by over 3000 Dutch physicians, and extending over several decades. Heymans and Wiersma declare that psychical faculties developed by use are hereditary, and that mental capacity is generally inherited from the father, and not from the mother; further, such capacity is, in the great majority of cases, transmitted exclusively to the sons. Among all the cases of alleged transmission observed, only two per cent. are said not to come within the range of heredity. Nevertheless it seems that the investigators have here confounded the influence of heredity with that of the surroundings. The fact that a certain percentage of mathematicians should have sons who manifest a taste for mathematics, can be just as easily adduced in support of the view that the influence of family life and of education is the primary cause of the development of this taste. It is evident that a father will seek to bring up his son in that sphere of life in which he himself has lived, and will endeavour to impart to his offspring his own tastes and interests. On the other hand, the fact that but few daughters manifest the capacity for abstract reasoning is explicable in the first place by the father interesting himself less in the education of his girls than of his boys; and, secondly, by the feminine brain being less adapted to this form of activity than the masculine one. Lastly the operations of this pretended " law " are far too variable in their nature for us to be able to admit its character as such. If the transmission of developed psychial faculties is a law of heredity, there is absolutely no valid reason for such a law manifesting itself only in a certain percentage of cases. If it be true that one mathematician begets another, there must be some certainty about it, for the characteristic of law is its unfailing certainty. But there is no certainty whatever, there is only arbitrary haphazard, if more than half the number of cases investigated yield no result; and this seems undoubtedly true of those studied by Heymans and Wiersma.[1] Even with regard to those cases in which the son shares the tastes of the father, the investigators themselves admit that 2 per cent. are not within the range of heredity, thereby allowing for the action of other factors, and so replacing the whole matter under discussion.

We may therefore exclude the purely somatic modifications effected by mutilations, use and disuse, from all influence on the germ-plasm. As regards the modifications effected by climate and temperature, are these susceptible of influencing the reproductive cells and so becoming " variations "? In some cases the reply must be affirmative, in others negative. In his celebrated experiments on *Oenothera Lamarckiana* De Vries found that a number of strongly marked variations suddenly manifested themselves in a number of individuals, and that these variations bred true—that is to say, the variants, when fertilised by their own pollen, brought forth the same variation in identical form. These " mutations " can only be due to the action of the climatic environment. The experiments of Weismann on *Polyommatus Phlœus,* a butterfly of the family of *Lycœnidœ* show that temperature undoubtedly exerts a strong influence on the pupa. At a temperature of + 10°C., he was able to produce the northern variety from the pupa developed from the egg of an individual of the southern variety; and at a temperature of +38°C., the contrary result was obtained, the southern variety being produced from the pupa of a northern egg. The experiments of Standfuss and Merrifield have shown that, by lowering the temperature to −8°C., it is possible to obtain aberrations from the normal type in the case of species of *Vanessa*. On the other hand, Nägeli cultivated 2,500 varieties of *Hieracium* at Munich, and observed that in every case the characteristic modifications due to change of habitat reappeared afresh in each successive generation; but experiments showed that these modifications were never inherited, being simply acquired anew; and thus we see that the soma may be susceptible to climatic influences, without the germ-plasm being affected.

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[1] We have before us only a very brief summary of these investigations in the *Politisch-Anthropologischen Revue,* vii Jahrgang, No. 6, p. 327.

We may, therefore, say that the germ-plasm is capable of being affected by climate and temperature, but that it is less susceptible than the soma, and that every somatic modification due to these influences is not inherited.

We come next to the fourth category of external or exogenous influences, those which react on the germ-plasm through the intermediary of the nutritive fluids of the organism. This category we have divided into two sub-sections, *i.e.*, the influence of food, and the influence of pathogenic infection. We will first consider the influence of food.

Collignon has studied the population of the Limousin from an anthropological standpoint, and has shown that in no other part of France is the population so small of stature.[1] This characteristic is not attributable to racial influences, as several different races are mingled together on the same territory and are all of them of uniformly small stature, but to the combined influence of climate and food. Generation after generation has lived in a raw and unwholesome climate, on an essentially unfruitful soil, and withal in wretched hovels situated amid deep, narrow, and foggy valleys. Stagnant water and boiled chestnuts formed—or continue to form—the almost exclusive nourishment. Under conditions such as these it is scarcely surprising that the stature should be reduced, as of course no surplus energy could possibly be furnished for the purposes of growth; and we might expect the germ-plasm to have been affected by such unfavourable influences, so that smallness of stature would become an hereditary trait. Nevertheless, this is not so, seeing that, as Collignon points out, individuals born in that region, but withdrawn from it during early infancy and subjected, during childhood, to other influences, grow normally and reach the same average height as any other persons; whereas, on the other hand, individuals not born in the region but imported into it during infancy, and who pass through the period of growth amid these unhealthy surroundings, are stunted in growth. These researches of Collignon show, on the one hand, that the arrest of growth is due to the influence of climate and food; and, on the other, that this somatic peculiarity, notwithstanding its persistency, has not affected the germ-cells, and is, consequently, not transmitted by heredity.

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[1] Collignon, *Anthropologie de la France*, in *Mémoires de la Société d'Anthropologie de Paris*, t. i. série 3, fascicule 3. 1894.

Other evidence tends to show likewise that differences in the quantity and quality of food absorbed affect the physical development of individuals, even to the extent of appearing to create well-marked racial variations. Professor Alfredo Niceforo has examined several thousands of school children at Lausanne, and also the skulls of one hundred peasants at Sepino, in Southern Italy.[1] Here are, briefly stated, some of the results arrived at by him: the height, at all ages, is greater among the well-to-do class than among the poor class (1 metre 680 for the former, on an average, 1m. 648 for the latter); the average weight of the well-to-do children examined at Lausanne is heavier than that of the poor children; the average strength and the average power of resistance to fatigue, both of these being measured by the dynamometer, are likewise superior among the well-to-do than among the poor. Several other characteristic traits were noticed by Niceforo, such as differences in the development of the perimeter of the thorax, in the probable weight of the brain, in the measurement of the cephalic index, in the breadth of the jaws, in the colouring of the eyes, etc.

Similarly Schwiening has observed a general progression in the average height of the recruits in all European countries where reliable statistical material is available.[2] In Germany, during the period 1894—1903 (Bavaria, Saxony, and Würtemberg are excepted), the number of small persons among the recruits has diminished, while that of tall persons has increased. In all European countries where sufficient data were to hand, Dr. Schwiening has remarked a similar tendency towards the diminution of the number of small recruits and the increase of the number of tall ones. Dr. Schwiening observes:—

"Es fehlt die sichere Kenntnis darüber, seit wann diese Wachstumstendenz begonnen hat, und welches die Gründe für die gleichmässig bei den verschiedenen Staaten nachweisbare Zunahme der Körpergrösse, wenigstens im militärpflichtigen Alter, sind. Vielleicht spielen bessere Ernährung im Säuglings,-Kindes-und Jünglingsalter und die besseren hygienischen Verhältnisse der letzten Jahrzehnte eine günstige Rolle."

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[1] Niceforo, *Essai sur l'Anthropologie des Classes Pauvres*, in *Archives d'Anthropologie criminelle*, t. xxii, No. 161, pp. 297—317. 1907.

[2] *Norddeutsche Allgemeine Zeitung*, 7 July, 1908. Schwiening's observations were first published in the *Deutsche Militärärztliche Zeitschrift*.

It is, however, impossible to draw any definite conclusions from these remarkable studies. The probabilities certainly are in favour of the view that these modifications, due to differences in the quality and quantity of food absorbed, are not hereditary, but are simply acquired afresh by each successive generation. If we turn once more to the observations made by Collignon on the inhabitants of the Limousin, we find that any individual withdrawn from a given environment and placed in a different one, will develop traits adapted to the new environment; but the children of this individual, if they are replaced in the former surroundings, will once more develop the corresponding traits, similar to those exhibited by their father before his emigration. Such traits do not affect the germ-plasm. In an individual is stunted in growth, it is not because his parents were also stunted, but because he himself has received insufficient food to enable a reserve of energy to be set aside for the purposes of growth. Applying these consequences of Collignon's discoveries to the case of the recruits noticed by Schwiening, it is reasonable to infer that, if the average height of the European recruit has increased during the last fifteen years, this is due to the fact that the general conditions as regards food and lodging have been improved; but this improvement reacts on each successive generation subjected to its influence, and does not modify the composition of the germ-cells. In the same way, the differences between the poor and the well-to-do children observed by Niceforo are due to food differences, and differences in the way of living generally. But place a poor child, during the period of development, in different surroundings, and the chances are 99 to 1 that it will present all the characteristic physical traits of the well-to-do.

The probability that the germ-plasm is unaffected by influences of diet is greatly enhanced if we consider, as Schallmayer suggests, the case of the aristocracy of Europe.[1] Although, during several centuries, the aristocracy were subject to the most favourable environmental influences, the average height of its individual members is in no wise superior to that of any other class of the population. Did the quantity and quality of food affect the germ-cells, its influence must inevitably have made itself felt during the course of successive centuries, and the average height of members of the aristocracy should be greater than that of the other classes; but, as we say, no such general difference exists.[1]

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[1] Schallmayer, *Eugenik, Lebenshaltung und Auslese*, in *Zeitschrift für Sozialwissenschaft*, xi Jahrgang, Heft 7-8, pp. 458—489. 1908.

The well-known and obvious fact that breeders are careful to feed their prize animals well does not in any way contradict the supposition that food influences do not affect the germ-plasm. Breeders feed a prize animal well because they evidently wish to get the utmost out of it; but there is absolutely no reason to suppose that, even if one of the parents were insufficiently fed, the progeny would on that account be of inferior value. Evidently if a person breeds animals, he will be careful to feed them well, for there would be no motive to induce him to do otherwise; but we must not, for this reason, suppose that the feeding is of primary importance in the process of breeding. What is of primary importance is that the organism should be capable of responding suitably to good feeding and favourable surroundings, not the nature or quantity of the food itself.

We may conclude this discussion by saying that, in the light of the evidence before us, there is no justification for the supposition that alimentary conditions influence the germ-plasm.

There remains, among the various exterior or exogenous influences to which organic life is exposed, the influence of a pathogenic infection of the organism. That not only microbic disease, but also certain toxic substances such as alcohol, can influence the germ-cells and modify the latter, is universally admitted. Nevertheless the range of hereditary influences is here also limited. By no means every microbic disease transmits itself hereditarily; on the contrary, the one case which seems definitely and indisputably ascertained is that of syphilis. Neither tuberculosis nor cancer appear to be hereditary in themselves. Such diseases do, however, *indirectly* react on the germ-plasm by weakening the constitution generally, and thus altering the composition of the organic fluids which nourish the germ-cells.

With regard to the consequences of hereditary syphilis, these are, or ought to be, well-known, after the researches of Fournier, Tarnowsky, and others have shown us beyond all dispute what they are.[1] Alcohol likewise exercises an incomparably worse influence on race and society than on the individual, for its effects menace less the individual who is too fond of it than his descendants. Dr. Bayertal found that, among five children suffering from convulsions during the first year, three were the offspring of men who, far from being habitual drunkards, were classed as *Gewohnheitstrinker;* and the other two were conceived in a moment of inebriety.[2] Dr. Ford Robertson mentions several other cases in which the hereditary transmission of alcoholism is clearly proved.[3]

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[1] Cf. also the observations of Weismann concerning the regression of the wings of worker ants, regression which is not due to food influences; and concerning bluebottle maggots which he systematically underfed without either the ovaries or any of the organs of the progeny being thereby affected. (*Vorträge über Deszendenztheorie*, ii. 102ff. Erste Auflage.)

It is unnecessary to go further into this matter here. We will merely state our conclusion, namely, that certain microbic diseases and certain toxic substances, introduced into the organism from outside, are capable of influencing the germ-plasm, and are consequently factors of much importance in race degeneracy. But we must beware of hasty generalisations; and the question as to the hereditary nature of a given disease cannot be solved in the light of any general principle. Every case must be examined exclusively on its own merits, and examined carefully, since the entire social aspect of any disease changes radically, according as to whether its effects are restricted to the individual or communicate themselves to the descendant of that individual.

Insanity may be reckoned among the category of pathogenic infections of the organism. It is probable that insanity is toxic in its nature; and it is certain that alcohol is one of the main factors in its production. Insanity is probably caused by the presence in the blood, by which the brain is stimulated to activity, of some noxious agent by which the stimulation is rendered faulty in its character, so as to produce perversion of function, and, ultimately, structural alteration of the brain tissue. Now, as the blood conveys nutrition to the germ-cells, the latter will likewise be impaired by bad nutrition; and, if the toxic substance remains sufficiently long in the organism, the entire blood stream will be infected by it, and the germ-cells will eventually be soaked in poison.

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1. Chatterton-Hill, *Heredity ond Selection in Sociology*, London, 1907, pp. 288—308. ("Syphilis as a Social Factor.")

2. *Psychiotrisch-Neurologische Wochenschrift*, ix Jahrgang, No. 43–44. 1908.

3. *British Journol of Inebriety*, Vol. i, No. 4, pp. 247, 248. Another symptom of race degeneracy, the growing inability of women to suckle their children, is attributed by Professor von Bunge to alcoholism; von Bunge has studied the cases of some 2,700 families, and declares that the alcoholic infection of the father destroys the suckling capacity of the daughter. (See the summary of these researches in *Politisch-Anthropologischen Revue*, v Jahrgang, No. 10.)

The result of the above discussion has been to show that the life of the germ-cells is to a very large extent—much larger than is commonly believed—independent of that of the organism. The study of the influence of the environment on the germ-plasm confirms the teaching of Weismann and Beard and Nägeli as to the essential difference between the reproductive and the somatic cells. Blows and injuries, use and disuse, do not affect the former in the least. It is highly probable that food, clothing, and hygienic conditions generally; likewise only affect the body-cells. Climate and temperature may affect the germ-plasm, but they do not always do so, as the experiments of Nägeli on *Hieracium* clearly prove. Finally, pathogenic infection does *sometimes* react on the reproductive cells, but by no means necessarily, such direct reaction having, as yet, only been proved in extremely few cases, of which syphilis, alcoholism and insanity are the chief.

Once this fundamental fact of the large degree of independence enjoyed by the germ-plasm is firmly grasped, it is evident that our views concerning the great problem of race progress and race degeneracy cannot fail to be modified thereby. But before going into the question of the influence of the environment on race progress or degeneracy, we must consider briefly another factor which greatly affects the future of society—we mean the internal or endogenous factor of the constitution of the *race* itself. This is a most vital factor of racial biology, especially if we bear in mind that the surest means of improving the constitution of the race is not to suppress all possible perils in the social environment, but to proceed according to principles of selective breeding, *i.e.*, to restrict the fertility of the unfit and increase that of the fit.

We have only space to notice quite cursorily the statistics compiled by Riffel [1] concerning the influence of the age of parents (*a*) on the number of offspring (*b*) on the fitness of the offspring. Already Rubin and Westergaard had calculated the relation of age to the degree of fertility to be as follows [2] :—

Marriage Age of the Man.	Number of Children per Married Couple.
Less than 25 years	3·50
25—29 years	3·25
30—34 years	3·02
35—44 years	2·28
45—50 years	1·10

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[1] Cf. summary in *Politisch-Anthropologischen Revue*, vii Jahrgang, No. 5, pp 264 ff.

[2] *Statistik der Ehen auf Grund der sozialen Gliederung der Bevölkerung*, p. 95. Jena, 1890.

Riffel, confirming these figures, has arrived at a similar result, after an inquiry into 531 marriages:—

Marriage Age of the Man.	*Average Number of Children born.*		*Number of unfit children born of unfit marriages.*	
	When wife younger than husband.	When wife older than husband.	When wife younger than husband.	When wife older than husband.
22—25	5·5	4·6	4·5	4·6
26—29	5·2	4·4	4·7	4·9

We see from these figures that the total number of children born diminishes with the increase of age of the parents, while the number of unfit children increases.[1] Even if the parents themselves are unhealthy they are more capable of producing healthy offspring when they are young and in full possession of their strength than when they are older. *Thus the age of parents is a factor to be taken into consideration, alike from the point of view of the fertility of marriage and from that of the capacity for begetting healthy descendants;* and, consequently, the economic conditions of society may react indirectly on the fertility and on the biological constitution of the race, in so far as they tend to prevent early marriage and to favour later marriage.

In examining the problem of race progress and degeneracy in Europe at the present time, we cannot fail to be struck by the remarkable decrease of fertility in France.[2] The number of deaths exceeded the number of births in 1907 by 19,920. True, in 1900, the number of deaths also exceeded the number of births, but only because the influence of the World Exhibition in Paris caused a general increase of the death-rate; and, in 1900, the total number of births was 866,543, whereas in 1907 it was but 773,969, and, further, the death-rate last year was normal. Since 1901 the fertility of French couples has been steadily diminishing, falling during this space of time from 230 births per 10,000 inhabitants to 207. Now, this diminution of fertility is in no way to be accounted for by the diminution in the number of marriages; on the contrary, the number of marriages celebrated in 1907 (314,913) has only once been exceeded, namely in 1873; and the latter year was by no means a normal one, owing to the number of marriages having been certainly artificially augmented by the irregular conditions prevailing during the three preceding years on account of the Franco-German war, and which prevented large numbers of marriages from taking place. We must, therefore, in order to explain this phenomenon, which is pregnant with consequences for the future of civilization, have recourse to other factors.

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[1] The investigations of Kider, *Statistische Beiträge zur Beleuchtung der ehelichen Fruchtbarkeit*, (Christtiania, 1903—05) fully confirm the above figures. Prof. von Bortkiewicz observes also: "Es zeigt sich dass der Prozentsatz der kinderlosen Ehen in hohem Grade von dem Alter der Eheschliessenden abhängt . . . Wie man sieht, steigt der Prozentsatz der unfruchtbaren Ehen mit zunehmenden Heiratsalter der Frau." (*Die statistischen Generalisationen*, in *Rivista di Scienza*, vol. v, No. ix, pp. 102—121, 1909.)

[2] Cf. the article of M. de Foville in *L'Opinion*, August 19, 1908. Also those of M. Paul Leroy-Beaulieu in *Journal der Débats*, August 29 and September 12, 1908.

The population of the present-day France is derived principally from two races, the dolichocephalous (*Homo Europeus*) being predominant in the north, and the brachycephalous type (*Homo Alpinus*) in the south. These races have, of course, mixed, and the French nation is the product of the constant mingling of two originally distinct and antagonistic racial elements; and this process of intercrossing goes on without interruption, owing to the perpetual stream which flows from the mountainous districts to the plains and valleys, and from the country to the town. Professor de Lapouge sees in this " bastardising " of the popuplation the main factor in the decrease of the birth-rate in France.[1]

" We see everywhere in our towns," writes Lapouge, " individuals with light eyes and dark hair; we find long faces combined with short crania; we find features which present all the appearances of having been made for another face—the nose too short, the mouth too broad, the chin too large. The arms are too short in comparison with the legs, or else the legs are too long for the body; the colour of the beard is different to that of the hair; brachycephalous persons have the typical aryan head . . . These palpable contradictions are often manifest in the shaping of one and the same organ. One side of the nose is too long, whereas the other side is too short; the eyes are differently coloured, or else the apple of the eye is placed in an eye-socket to which it is not adapted; the two hemispheres of the cranium are asymmetrical. This inner disharmony cannot but diminish the fertility of the products of such excessive crossing, especially as it frequently results in asymmetry of the uterus, or in a diminution of the vital power of the spermatozoa." [2]

The truth of the latter assertion is confirmed by the well-known phenomenon that, whereas among all other mammals the concep-

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1. *Recherches anthropologiques sur le Problème de la Dépopulation*, in *Revue d'Economie Politique*, 1895, p. 1002, and 1896, p. 132.

2. *L'Hérédité dans la Science Politique*, in *Revue d'Anthropologie*, 1888, p. 184.

tion of progeny follows immediately on the female being covered a first, or, at the latest, a second time; among the human species the average time between marriage and the birth of a first child is from 16 to 17 months; or, in other words, procreation does not, on an average, take place until after a lapse of seven or eight months. This highly significant phenomenon, to which Lapouge has called attention, shows clearly that the procreating power of the human branch of the mammalian class—from whatever cause it may be—has suffered a marked regression, and is inferior to that of other species.[3]

The psychological difference between the two races is not less marked than the physical difference. The average dolichocephalous individual is individualistic, energetic, progressive; the average brachycephalous one is characterised by a strong belief in the efficacity of State action, as opposed to unrestrained individual liberty; he is consequently more or less indolent, timid, and conservative. There is no equilibrium among his psychical faculties, and his bursts of energy, although violent, are of short duration. In short, between the average northern and the average southern Frenchman there exists the same psychological difference, which is obvious to everyone, which exists between the average southern Frenchman and the average Norwegian.

Let us ask ourselves now, what must be the result of the union of two persons, each one of whom is tainted by physical disharmony, and the psychological characteristics of each are so profoundly different? Obviously, a first consequence must be the rearing of children, the asymmetry of whom will be still further accentuated; and a second inevitable consequence will be not less disastrous, as far as the fertility of the union is concerned, because it is a moral one, *i.e.*, the lack of that deep and intimate comprehension one of another by husband and wife, which alone can guarantee happiness in the wedded state. Where complete psychological heterogeneity exists—nay, complete psychological antagonism—estrangement must speedily ensue; and, although this estrangement need certainly not become enmity—in which case, in France, divorce offers an easy and reasonable solution—nevertheless it will, in the majority of cases, have an unfavourable repercussion on the fertility of the marriage.

[3] Lapouge, *Recherches*, etc., *loc. cit.*, 1895, p. 1011, observes: "J'ai attiré depuis longtemps l'attention sur l'asymétrie fréquente de l'utérus chez certaines métisses, et en particulier chez beaucoup de femmes de sang très mélangé. Elle est beaucoup plus fréquente chez les métisses *d'Homo Alpinus*."

Wieth-Knudsen has made a classification of the French departments [1] based on the average number of immigrants contained in each given group. This classification is based on the official figures given in the *Recensement de la Population,* 1901, and in the *Statistique annuelle du mouvement de la Population,* 1901—1902. The departments are classified in groups according to the number of persons inhabiting them who were born outside the department; and thė average fertility of each group is given. The result of this inquiry was as follows :—

Number of Departments in each Group.	Among 1,000 inhabitants how many were born outside the department. Census 1901.	Total number of married women between 15—45 years of age.	Average number of legitimate births (inclusive of stillborn infants) among 1,000 married women. 1901-2.
1st Group, Seine Dept.	574	522,900	121
2nd Group, 13 Depts.	485 (max.) 230 (min.)	848,400	146
3rd Group, 20 Depts.	220—170	876,100	150
4th Group, 18 Depts.	166—128	852,800	167
5th Group, 18 Depts.	127—88	875,600	181
6th Group, 17 Depts.	87—25	850,200	224

We see from this statistical table that *the number of legitimate births increases in direct proportion to the diminution of the number of immigrants from outside, in each group of departments.* These figures certainly speak in favour of the theory of Lapouge. That the psychological antagonism of parents diminishes the fertility of marriage as much as physiological asymmetry, is of course more or less a deduction which we make *a priori* as a result of a consideration of probable consequences. Figures given by Wieth-Knudsen in the aforementioned essay as regards marriages between persons of heterogeneous religious beliefs, do however confirm this *a priori* deduction. Official statistics of the Kingdom of Prussia for the period 1875—1900 bring the following results :—

Harmonious Marriages.

Average fertility of Catholic marriages, 5 children.

Average fertility of Protestant marriages, 4 children.

Average fertility of Jewish marriages, 3, 8 children.

Disharmonious Marriages.

Average fertility of mixed Catholic-Protestant marriages, 3, 1 children.

Average fertility of mixed Jewish-non-Jewish marriages, 1, 7 children.

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[1] Wieth-Knudsen, *Rassenkreuzung und Fruchtbarkeit,* in *Politisch-Anthropologischen Revue,* vii Jahrgang, No. 6.

We see that the least fertile unions are those in which racial asymmetry is combined with religious disharmony, in the case of marriages between Jews and non-Jews. But the marriages between Catholics and Protestants are likewise less fertile than any of the "harmonious" marriages.

In the case of France other causes are certainly at work, causes which are economic in their nature; but we are inclined to think that these economic causes are secondary. There is certainly much truth in Olberg's contention[1] that "Eheleute, die sich freiwillig enthalten, Kinder zu erzeugen, beweisen dadurch zweifellos eine Entartung, eine Störung ihrer physiologischen ökonomie, sie mögen äussere Stigmata dieser Entartung tragen oder nicht." Schallmayer, in the essay already quoted by us,[2] contests this assertion and maintains that the sexual instinct of man is not to be confounded with the "conceptual" instinct. But this argument appears to us wholly insufficient, and its author seems to labour under a misconception as to the meaning of instinct and the *rôle* played by it in the struggle for existence. Instinct is developed by natural selection, for it is a case of adaptation, often unconscious, called forth by the elementary necessities of life itself: the persistence of the species depends on the adequate development of its instincts. Now, the most fundamental of all instincts is the sexual one, and on this instinct depends, first and foremost, the life of the species, *because it ensures the reproduction of the species*. Can we find any traces, among any other animal species, or among any of the primitive races of the human species, who live amongst unadulterated natural conditions, of a "conceptual" instinct apart fro mthe sexual one? The two are inseparable; and, where they are separated, as may be the case among certain highly-civilised nations, this is in itself already a sign of degeneracy. Why should natural selection have been at such pains—if we may speak figuratively—to maintain this fundamental instinct, if it were merely a luxury, and not a necessity? And what reason could there possibly be for the existence of this luxury?

Every instinct has its reason in the necessities of life, and this is why natural selection has been careful to breed and develop any given instinct by eliminating all those individuals who possessed it insufficiently. The colouring of the fore-wing of *Phyllodes*

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[1] *Fruchtbarkeit*, in *Zukunft*, 16 March, 1901, pp. 477 ff.

[2] *Eugenik*, etc., in *Zeitschrift für Sozialwissenschaft*, *loc. cit.* "Der normale Mensch besitzt nicht einen Fortpflanzungstrieb, sondern nur einen Geschlechtstrieb."

ornata possesses biological value for that species, enabling it to escape detection by its enemies. Those insects whose fore-wing was less perfectly adapted to the colour of the surrounding leaves were more likely to be detected and destroyed. Now we must bear in mind that, to this morphological peculiarity, is added a corresponding instinct to lie motionless at the approach of an enemy, or on hearing any suspicious sound. This instinct, in harmony with the morphological structure of the organism, is a vital necessity for the species; and it is maintained by natural selection continually weeding out those individuals who, having a less developed instinct, do not remain motionless on the approach of danger, and betray their presence to their foes by stirring. So it is with every instinct, and so, of course, is it with the most fundamental of them all, on which the continuity of the species depends.

Every instinct, as we have said, has a reason in the necessities of life. Every instinct tends either to the reproduction of the species, or to the survival of the individual by enabling the latter to procure prey or to escape danger. But what would be the reason of a "sexual" instinct apart from all idea of reproduction? As an outlet for superfluous physiological energy it would be wholly unnecessary, as muscular or cerebral work achieves the same object with less expenditure of nervous force. The separation of the sexual instinct from the notion of reproduction is but a perversion of the former, and is directly contrary to natural law. The very fact of such a separation existing is in itself a symptom of degeneracy.

To sum up this discussion we may say that the *primary* cause of the diminishing fertility of the French nation seems to be the ever-increasing disharmony and asymmetry of the population—both physiological and psychological—due to excessive intermingling and intercrossing, which has brought about ever-increasing "hybridisation." There are also *secondary* causes which tend to make themselves felt especially strongly among the upper and middle classes, and among the peasantry; but we lack space to glance at these now. Chief among them is the system of deliberate restriction but this system is itself the physiological consequence of underlying economic causes.

To the question—Is the tendency towards a diminution of fertility a healthy one? we would reply as a general rule in the negative. It impoverishes a nation by furnishing less material for natural selection to act upon; less material from which statesmen, philosophers, men of science, who enrich the intellectual patrimony, financiers and business men, who increase the material wealth, can be chosen. With regard to the consequences for France to-day, such a tendency must inevitably place her, from the military and commercial points of view, in a position inferior to her fertile rivals, Germany and Italy; and in view of the many admirable and great services which France has rendered to humanity, the consequences entailed, in the future, by her possible inferiority, could not be too highly deplored. The hypothesis of future inferiority in the military and commercial spheres is one which we consider with the deepest regret concerning a country of which we are proud to think that we are in the truest sense of the word a citizen, and to which we are consequently attached by all the dearest and most intimate ties of life, thought, and language.

Much more important, then, than the influence of environmental conditions on the germ-plasm, is the influence of internal or endogenous conditions. The truth of the dictum that the only guarantee for the fitness of any given society lies in the selection of its best members for breeding purposes, and not in the creation of favourable environmental conditions, is proved strikingly in the case of France. In no country has civilisation attained a higher zenith than in France, in no country has the fight against tuberculosis and other contagious diseases have been more energetically pursued; and, to add to this, the diminution of fertility, which leaves a country which could support 80,000,000 inhabitants to be inhabited by scarcely half that number, must reduce the struggle for existence by reducing the number of competitors; thereby rendering life easier and alleviating many of those intolerable miseries which are the result of an unnecessarily brutal strife. All these forces at work tend to improve the conditions of life; and yet, do they improve the *race*, do they enhance its biological value? We answer: not necessarily. Mere improvement of environmental conditions does not affect a given course of hereditary evolution.

The fact is that not only are the germ-cells to a very large extent independent of external or exogeneous environmental conditions, but that they also possess a capacity which is practically limitless within the bounds set by the vital conditions of the species, for spontaneous variation. According to Weismann, spontaneity would appear to be the origin of every germinal variation, as on the one hand the great quantity of possible combinations afforded by the number of the ids, and on the other the increasing perturbations caused by the miniature struggle for life among the determinants around the nutritive fluid of the germ plasm, must continually bring forth a vast number of variations for selection to operate with; and all these variations are spontaneous, *i.e.*, they arise independently of environmental conditions (we do not, of course, speak of variations caused by toxic infection), and are only *subsequently* checked or favoured, when they attain to biological importance, and according as they do or do not promote the adaptation of the species to its surroundings. The somatic results of such spontaneous germinal variations are well-known. For instance, different puppies belonging to the same litter will nevertheless differ among themselves. Recent experiments of Przibram[1] have shown the following result to be obtained in breeding: a female cat whose right eye was blue and left eye yellow, was paired with a male cat with two blue eyes. Their five kittens had respectively: one of them two yellow eyes, two others two blue eyes, a fourth had a yellow right eye and a blue left eye, the fifth had a blue right eye and a yellow left one. Thus every possible combination was represented in this single litter. All such variations are spontaneous.

It is difficult to judge as to whether a race is progressing or degenerating, as such progress or degeneracy is not the affair of a day, or of a century, but of long periods. Above all things, we must beware of confounding mere *ontogenetic* progress or regression with *phylogenetic* progress. For instance, as we have said, the increase of stature is not a proof of racial improvement; for such increase of stature, observable to-day in most European countries, is doubtless due, at all events in part, to better food and better conditions of living generally; and, as we pointed out, there is no reason for supposing that such conditions affect the germ-plasm. In the same way greater longevity cannot be accepted as proof of phylogenetic progress. Greater longevity may, indeed, even go hand-in-hand with racial degeneracy, for it may simply be due to the removal from the environment of certain diseases which formerly eliminated weak persons; or it may be due to better hygiene, which protects sickly and feeble children and allows them to reach maturity and to multiply; and under such conditions the most sickly may attain old age. We may be permitted to reproduce some figures formerly cited by us in support of our contention that increased longevity and race degeneracy may go hand-in-hand.[2] The one thing which most forcibly strikes the observer when he studies the British Registrar-General's statistics concerning the death-rates, is the increase of infantile longevity and the concurrent decrease of juvenile mortality. But this phenomenon has unfortunately its counterpart in the increased mortality, in the diminished standard of life, of persons of forty-five and upwards. Thus in thirty years, from 1870 to 1900, the mortality of male infants under five fell from 75·0 to 58·0 (per 1,000 living males); that of children from five to ten years from 8·9 to 3·9; and that of children from ten to fifteen years from 4·5 to 2·2, or less than half. On the other hand, the mortality-rate among persons of thirty-five years of age has, during the same period, only fallen from 13·8 to 12·5; while that of persons from forty-five to fifty-five years of age has *increased* from 19·6 to 20·8; and that of persons from fifty-five to sixty-five years of age has increased from 33·9 to 38·9.

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[1] *Archiv für Entwicklungsmechanik des Organismus*, Band xxv, Heft 1–2.

[2] Chatterton-Hill, *Heredity and Selection*, *loc. cit.*, pp. 342, 343.

The lesson to be drawn from these figures is that ever-increasing numbers of weakly children have had their lives artificially preserved by medical science, who would otherwise have died in early infancy. These weak individuals, thus permitted to attain maturity and reproduce themselves, constitute a menace for the race, for they beget fresh generations of weaklings. Thus the decrease of juvenile mortality cannot be taken as a symptom of race progress; nor could the general increase of longevity or the general decrease of mortality. For both phenomena may be due to an improvement of the environment which enables the weak and sickly to avoid the dangers that would naturally beset them; but a race which thus counteracts the working of selection does so only at the risk of imminent peril, for it has entered on the path which leads to degeneracy and bankruptcy.

It is likewise extremely difficult to estimate the progress or degeneracy of a race according to the development of its intelligence. We by no means subscribe to Dr. Archdall Reid's views that mental tendencies and capacities are never inborn; for we hold that psychical traits correspond to anthropological types, and that the difference between, for instance, Eastern and Western thought, cannot be bridged over; any more than a negro tribe, however favourable the environment, can rise beyond a certain level of intellectual culture. But it is very hard to measure the distance which separates one period from another, as intelligence does not by any means mean the mere *amount* of knowledge; and, on the other hand, wider diffusion of education permits of a much larger amount of latent intelligence becoming active; but this latter phenomenon certainly does not imply that as much latent intelligence, or potential intelligence, did not exist in former ages as now. It is very probable that, if we take into consideration, firstly, the increase of the number of instruments at our disposal for the acquiring of knowledge, and the continual perfecting of these instruments; secondly, the great diffusion of education at the present day, and the facilities afforded for learning; it is very probable, we say, if we take these factors into consideration, that the Middle Ages were, on the whole, as intellectual as the contemporary era is. The production of Augustine, Roger Bacon, Thomas Aquinas, Dante, Giordano Bruno, Savonarola, among the Christians; of Averroes, Avicenna, and the illustrious historian Khaldoun, among the Mohammedans; tends to show that the latent intellectual capacity of the Middle Ages was not a wit behind that of to-day.[1]

The germ-plasm then, we repeat, is in a very large measure independent of environmental conditions; when we have acquired this certainty, the result should be to make us considerably more optimistic as to the future progress of the human race in the Western world; for we see that the biological and hygienic conditions under which large masses of the population live, shameful and deplorable as they very frequently are, do not menace the physical welfare of society as much as is commonly thought.

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[1] Already we find Auguste Comte protesting against "l'ingrate injustice de cette frivole philosophie qui conduit à qualifier irrationnellement de barbare et ténébreux le siècle mémorable où brillèrent simultanément, sur les divers points principaux du monde catholique et féodal, Thomas d'Aquin, Albert le Grand, Roger Bacon, Dante, etc." (*Cours de Philosophie Positive*, 5e éd., t. v, p. 376). And Comte says, further on: "Loin d'être radicalement hostile au développement intellectuel, comme on l'a trop proclamé, sous l'unique impression, d'ailleurs exagérée, des temps de décadence, le catholicisme l'a, au contraire, éminemment secondé." (*Ibid.*, p. 379.) Nevertheless, while recognising what is due to the Christian Church, we owe an especially deep debt of gratitude to Islam for the intellectual revival which took place under its auspices.

G. CHATTERTON-HILL.

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